

# Radiation Dosimetry Healthcare Calibration Services





### Therapy level absorbed dose & air kerma (low & medium energy x-rays & $^{60}\text{Co}$ ) for thimble chambers

Technical contact: Julia Pearce, e-mail: [dosimetry@npl.co.uk](mailto:dosimetry@npl.co.uk),  
Tel: 020 8943 6337

- ▣ For instruments intended for use as secondary standards or others required for measurements of the greatest accuracy.
- ▣ Calibration of an ionisation chamber with or without an electrometer.
- ▣ Secondary standard chamber types 2561 and 2611, and Farmer type 2571 are accepted. Other chamber types may be accepted after confirmation with NPL.
- ▣ Batch calibrations are undertaken between February and April each year. A small period may also be offered in the Autumn.
- ▣ Further information at: [www.npl.co.uk/dosimetry/photons](http://www.npl.co.uk/dosimetry/photons)

### Air kerma (very low energy x-rays) for thin window chambers

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Tel: 020 8943 6337

- ▣ For instruments intended for use as secondary standards or others required for measurements of the greatest accuracy.
- ▣ Calibration of an ionisation chamber with or without an electrometer.
- ▣ PTW 23342, 0.02 cc, PTW 23344, 0.2 cc and other similar chambers are accepted after confirmation with NPL.
- ▣ Batch calibrations are undertaken between February and April each year.
- ▣ Further information at: [www.npl.co.uk/dosimetry/photons](http://www.npl.co.uk/dosimetry/photons)



### Absorbed dose to water calibration service for electron beam radiotherapy

Technical contact: Graham Bass, e-mail: [dosimetry@npl.co.uk](mailto:dosimetry@npl.co.uk),  
Tel: 020 8943 6503

- ▣ This service is designed to be used with the IPEM Code of Practice (2003). The IAEA Technical Report No. 398 can also be used, but this report is not recommended by the IPEM.
- ▣ Calibration of NACP-02, Roos (PTW and Wellhöfer) and graphite-walled Farmer chambers (NE2571, PTW30004).
- ▣ Uses  $R_{50}$  alone as beam quality specifier to define reference depth. Beam qualities presently covered in the range  $R_{50}=1.6$  cm to 8.9 cm (nominal incident electron energies 4 MeV to 22 MeV).
- ▣ Uncertainties for direct calibration  $\pm 2\%$  at the 95% confidence level.
- ▣ Characterisation of recombination behaviour of each chamber in terms of dose per pulse.
- ▣ Batch calibrations are undertaken between February and April each year. An on-demand service is also available.
- ▣ Further information at: [www.npl.co.uk/dosimetry/electron](http://www.npl.co.uk/dosimetry/electron)

## Audit services for therapy level MV photons, electrons & medium energy X-rays

Technical contact: Russell Thomas,  
e-mail: dosimetry@npl.co.uk, Tel: 020 8943 6052

- An audit at a single quality consists of a beam quality check, output measurement and field instrument calibration. Paperwork, data recording by the centre, procedures etc are NOT examined.
- An audit in a single modality takes several hours, depending on number of qualities.
- The audits are arranged at the centre's convenience, and can be performed after normal working hours or at weekends.
- The electron beam audits carried out are only performed at centres that have implemented, or are in the process of implementing, the IPEM 2003 Code of Practice.
- Further information at: [www.npl.co.uk/dosimetry/audit](http://www.npl.co.uk/dosimetry/audit)



## Alanine reference dosimetry service for radiotherapy



Technical contact: Dr Peter Sharpe, e-mail: chemdos@npl.co.uk,  
Tel: 020 8943 6647

- NPL operates a mailed alanine reference dosimetry service for  $^{60}\text{Co}$   $\gamma$ -rays and megavoltage photon beams.
- Use of phantom set enables small alanine dosimeters to be irradiated alongside ionisation chambers in radiotherapy photon beams. On return to NPL, the dose received by the alanine is determined by measuring the concentration of stable free radicals using electron paramagnetic resonance spectrometry.
- Convenient mailable solid-state dosimeter that can be used in stacks to give dose distribution information and can be used in small fields e.g. as used in IMRT.
- Near tissue equivalence and very low energy dependence.
- Precision of single dosimeter measurement better than  $\pm 1\%$  at  $1\sigma$  for doses between 5 Gy and 10 Gy.
- Available on demand throughout the year.
- Further information at: [www.npl.co.uk/dosimetry/alanine](http://www.npl.co.uk/dosimetry/alanine)

## Dosimetry services for ophthalmic applications

Technical contact: Graham Bass, e-mail: dosimetry@npl.co.uk, Tel: 020 8943 6503

- Calibration of Ru-106 and Sr-90 curved and planar ophthalmic applicators.
- Calibration in terms of absorbed dose rate to water, normally at 0 mm and 2 mm depth.
- Uncertainty of calibration is estimated to be  $\pm 7\%$  at the 95% confidence level.
- Available by arrangement throughout the year.
- Turnaround time approximately 2 weeks.
- Further information at: [www.npl.co.uk/dosimetry/ophthalmic](http://www.npl.co.uk/dosimetry/ophthalmic)

## HDR Brachytherapy calibration service

Technical contact: Thorsten Sander, e-mail: dosimetry@npl.co.uk, Tel: 020 8943 6226

- Calibration service for Ir-192 High Dose Rate (HDR) Brachytherapy dosimeters.
- For instruments intended to be used as secondary standards or others required for measurements of the greatest accuracy.
- Calibration of an ionisation chamber with or without an electrometer.
- Calibration of well-type (re-entrant) chambers suitable for HDR sources.
- Calibration of thimble chambers with customer provided calibration jig.
- Electrometer calibration (charge or current calibration).
- Calibrations are normally undertaken in the spring and are carried out using a microSelectron Ir-192 HDR source.
- Further information at: [www.npl.co.uk/dosimetry/brachytherapy](http://www.npl.co.uk/dosimetry/brachytherapy)



## LDR Brachytherapy calibration service

Technical contact: Michaela Baker, e-mail: [radioactivity@npl.co.uk](mailto:radioactivity@npl.co.uk), Tel: 020 8943 6283

- ▣ Calibration service for Low Dose Rate (LDR) Brachytherapy sources.
- ▣ Calibration of I-125 seeds and Ir-192 wires and pins, including:
- ▣ Sources are calibrated with the Fidelis secondary standard radionuclide calibrator.
- ▣ Source calibrations in terms of Air Kerma Rate ( $\mu\text{Gy/h}$  at 1 m).
- ▣ I-125 seeds (e.g. IMC 6711 OncoSeed™, IMC 7000 RAPIDStrand™)
- ▣ Ir-192 wires and pins (e.g. Amersham ICW-series).
- ▣ Available by arrangement throughout the year.
- ▣ Further information at: [www.npl.co.uk/dosimetry/brachytherapy](http://www.npl.co.uk/dosimetry/brachytherapy)
- ▣ Calibration of other source types/configurations possible.



## Calibration of Secondary Standard Electrometers

Technical contact: Graham Bass, e-mail: [dosimetry@npl.co.uk](mailto:dosimetry@npl.co.uk), Tel: 020 8943 6503

- ▣ NPL offers a calibration service for electrometers used with secondary standard ionisation chambers, available on demand throughout the year.
- ▣ Calibration in terms of charge and/or current.
- ▣ Uncertainty estimated to be  $\pm 0.2\%$  at the 95% confidence level.
- ▣ Turnaround time approximately 1-2 weeks.
- ▣ Available on demand or with associated ionisation chamber during related calibration period.
- ▣ Further information at: [www.npl.co.uk/dosimetry/electrometers](http://www.npl.co.uk/dosimetry/electrometers)

## Diagnostic and Mammographic Air Kerma



Technical contact: Martin Kelly, e-mail: [dosimetry@npl.co.uk](mailto:dosimetry@npl.co.uk), Tel: 020 8943 8502

- ▣ For instruments intended to be used as secondary standards or others required for measurements of the greatest accuracy.
- ▣ Calibration of either an ionisation chamber alone or of a complete instrument is available.
- ▣ X-ray qualities in accordance with IEC 1267: Medical Diagnostic X-ray Equipment – radiation conditions for use in the determination of characteristics.
- ▣ Air kerma rates in the range 5 mGy/hr to 50 mGy/hr.
- ▣ Calibrations are normally carried out between October and December each year.
- ▣ Further information at: [www.npl.co.uk/dosimetry/diagnostic](http://www.npl.co.uk/dosimetry/diagnostic)

## Calibration Service for kVp Meters

Technical contact: Martin Kelly, e-mail: [dosimetry@npl.co.uk](mailto:dosimetry@npl.co.uk), Tel: 020 8943 8502

- ▣ Calibration of non-invasive voltage measurement equipment (kV meters), traceable to standards of electrical potential.
- ▣ Instruments are calibrated in X-ray fields produced using a constant potential high voltage generator.
- ▣ For Mammographic kV meters:
  - Meters calibrated using a molybdenum-anode X-ray tube.
  - Measurements available from 25 kV to 50 kV in 1 kV steps at maximum tube current ranging from 30 mA at 25 kV to 20 mA at 50 kV.
- ▣ For Diagnostic kV meters:
  - Meters calibrated using a tungsten-anode X-ray tube.
  - Measurements available from 40 kV to 150 kV in 5 kV steps.
- ▣ Available by arrangement throughout the year.
- ▣ Further information at: [www.npl.co.uk/dosimetry/kvpmeters](http://www.npl.co.uk/dosimetry/kvpmeters)



Contact details	Further information
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